lected from the statuettes. The pale blue rust can be best removed as follows: The statuette is immersed in a bath of hot water and live steam passed in for one hour to keep the temperature up to 100° C. The sodium carbonate is thus completely dissolved, the blue color changing to black as the sodium carbonate goes into solution. Careful brushing from time to time facilitates the process. After about one hour's treatment the metal is exposed and the rust completely removed. The dark green patina is not at all altered by this treatment. Any loosely adhering fragments of stucco can easily be preserved by exercising a little ordinary care.

The *pale green* excrescence resembles the pale blue in almost every particular except the color. It occurs in patches or layers sometimes several millimeters in thickness, and can be distinguished from ordinary patina by its lighter color and more powdery appearance. On chemical analysis it was found to contain no sodium carbonate and to consist mainly of copper carbonate. The removal of the pale green corrosion is much more difficult and liable to damage the statuette. With care, however, the following method gives good results: The bronze is immersed in a hot solution of five per cent. caustic soda for several minutes. The green color immediately turns to blue and the rust is loosened sufficiently to be removed with a dull instrument. Alternate treatment with the alkali and mechanical scraping will finally remove all of the corrosion. All of the alkali must now be removed by careful rinsing, and if necessary with a very dilute solution of hydrochloric acid. The dark green patina is also removed by this process and an ancient statue may acquire an undesirable appearance of newness.

The desirability of cleansing the bronzes at all must also be considered. In the case of the pale blue corrosion this seems necessary, as considerable quantities of metal can be destroyed by the action of the sodium carbonate. In the case of the pale green the destruction of the metal does not take place as rapidly, and other factors must be considered. If the bronze is to be used as a show specimen it is better to leave it unchanged in its antique appearance. For purposes of study, however, a complete cleansing of the surface is necessary, as tracings and engravings have often been exposed which otherwise might not have been revealed. After cleansing the statues should be kept as much as possible in a dry atmosphere. Statuettes in the Boston Museum cleansed by the above methods and placed in air-tight cases have not again become corroded. Some implements are made of very thin metal, and the removal of the thick layer of corrosion would leave too thin a shell. Such cases must be individually considered, and it is better not to place the responsibility of cleansing valuable bronzes in unreliable hands.

WALDEMAR KOCH.
CHICAGO, ILL., September, 1902.

NOTE ON THE CIRCULAR SWIMMING OF SAND-DOLLAR SPERMATOZOA.

WHILE studying artificial parthenogenesis in the sand-dollar (*Echinarachnius parma*) during the past summer, the writer independently observed that when the spermatozoa of this species are placed in a drop of sea-water on a slide they nearly or quite all gather at the upper and under surfaces of the drop and move there in circles. As seen from above, those at the upper surface move in a clockwise direction, and those at the under surface in a counter-clockwise direction. That is, since the head of the spermatozoon is directed towards the surface of the water, considered from its position the motion is always counter-clockwise.

This motion is so common as to seem at times to be universal, and it occurs without regard to the presence or absence of a cover-glass above the drop. The circle is approximately constant in size, having a diameter of about the length of the spermatozoon.

This attraction of the spermatozoon to the surface of the drop apparently shows it to be strongly stereotropic. Two possibilities suggest themselves as explanations of the circular motion. One is that the spermatozoon is differentiated in two planes, so that it has what may be called dorsal, ventral, right and left

sides. We may then say that the dorsal side of the spermatozoon is always directed toward the surface of the drop and that its body is bent or curved toward the left. The second possibility is that the condition here is the same as that described in certain insects by Ballowitz,* who considers the circular motion as a modification of the normal spiral motion which these spermatozoa have when in the middle of the fluid. Being at the surface, further progress in that direction is impossible.

Besides the above-mentioned article by Ballowitz, Dewitz † has described circular motion in the spermatozoa of *Periplaneta orientalis* and other insects, and Dungern ‡ and Buller § have found this phenomenon in all classes of the Echinodermata. Buller's paper, dealing with this subject in some detail and including a study of closely allied species, makes any further account of my observations an unnecessary repetition. It is to be hoped, however, that more careful studies on the structure of the Echinoderm spermatozoon will throw some light on the cause of this interesting phenomenon if, as seems probable, it be structural.

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Lasell Seminary, Auburndale, Mass.,
December 23, 1902.

NOTES ON ENTOMOLOGY.

The question of the interpretation of the mouth parts of Diptera has long been a bone of contention among entomologists. Mr. Walter Wesche in a recent article|| has furnished some additional light on the subject. The author found, by examining the cibarian structure of various flies, that in a few forms there are distinct, though small, projections arising from the proboscis near the base of the hypopharynx. He considers them as 'rudiments' (vestiges) of palpi. They are quite prominent in species of *Hyetodesia, Spilogaster* and *Hydrotea;* and more or less distinct in many Anthomyidæ, Sarcophagidæ, Borboridæ and Sepsidæ, and even in the common house-fly. The position of these palpi indicates, according to the author, that they are maxillary. Therefore, the large palpi of Diptera are labial, and the proboscis is not formed by the union of the labial palpi. The author appears to be ignorant of Dr. Smith's work on the same subject, in which he records two pairs of palpi in the Tabanidæ. Both authors, however, agree that the proboscis is not part of the labium.

The third volume of Mr. Tutt's 'British Lepidoptera' has been issued.* It is a volume of nearly 600 pages, much of it in fine print. Like the other volumes, its most remarkable feature is the labyrinthine wealth of technical detail. All that has ever been published on British Lepidoptera has been carefully studied, and everything that could be of the slightest interest is reproduced here. This third volume treats of but thirteen species, several species occupying over twenty-five pages, and one, *Lasiocampa quercus,* more than sixty pages. Although the work deals with British insects, the amount of matter on biological subjects is so great that the book can but be of immense interest to all concerned in the study of Lepidoptera.

Professor R. Blanchard has given an interesting review† of the poisonous punctures of certain Hemiptera. He records the finding of an Anthocorid, *Lycotocoris campestris,* in a bed in Liverpool, and a large Reduviid, *Rhodnius prolixus,* that at times attacks man in the United States of Colombia. The latter is known locally as the 'Bichuque.' He summarizes what has been written on the 'kissing bugs' of the United States, and adds some European cases of the punctures of *Reduvius personatus.*

Articles on mosquitoes are now quite the

* *Zeitschr. f. wissen. Zool.*, Bd. L., 1890, p. 393.

† *Arch. f. die gesammte Physiologie*, Bd. XXXVIII., 1886, p. 358.

‡ *Centralbl. fur Physiologie*, Bd. XV., April, 1901, Heft 1.

§ *Quart. Jour. Mic. Sci.*, Vol. 46, Pt. I.

|| 'Undescribed Palpi on the Proboscis of some Dipterous Flies, with Remarks on the Mouth Parts of Several Families,' *Trans. Roy. Micr. Soc.*, August, 1902, pp. 412–416, 2 pls.

* 'A Natural History of the British Lepidoptera,' Vol. III., London, July, 1902.

† 'Sur la piqûre de quelques Hémiptères,' *Archives de Parasitologie*, V. (1902), pp. 139–148.